

# Basic Network Concepts

## Question for Lecture 8

**1. Distinguish between telecommunications and data networking.**

**Telecommunications** is a broad concept that embraces voice and video communication as well as the transmission of **data** (words, numbers, still images, and so forth).

In **data networking**, at least one of the parties is a computer

**2. a) What is a network? b) What are the six main elements of a typical network?**

a) A **network** is a system of hardware, software, and transmission components that collectively allow two application programs on two different stations connected to the network to communicate well.

b) The six major hardware, software, and transmission elements found in networks are messages, applications, stations, switches, access links, and trunk links.

**3. What is a client/server architecture?**

In a **client/server architecture**, client computers receive service from server computers.

**4. a) what systems are considered to be PCs? b) What is a Wintel PC? c) Give examples of some mobile client stations. d) What is a NIC?**

a) Wintel PCs and Macintoshes are both considered PCs. Note: LINUX PCs should have been included, but they are quite rare.

b) **Wintel** PCs run client versions of the Microsoft Windows operating system and use a standard Intel Pentium microprocessor or a compatible microprocessor from one of Intel's competitors.

c) Some examples of mobile client stations are notebook computers, cellular telephones (cell phones), personal digital assistants, and tablet PCs.

d) A **network interface card (NIC)** is a printed circuit board that allows a computer to communicate over a network.

**5. a) What are the three types of servers? b) What is a NOS? c) What are the popular NOSs for PC servers? d) Distinguish between PC servers and workstation servers in terms of hardware and software. e) Distinguish between PC servers and workstation servers in terms of ability to handle large processing loads.**

a) The three types of servers are PC servers, workstation servers, and mainframes.

- b) A network operating system (NOS) is an operating system designed to run on a server.
  - c) Popular NOSs for PC servers include Windows, UNIX (including LINUX), and NetWare.
  - d) PC servers use mass-production Intel and Intel-compatible microprocessors, while workstation servers use fast and expensive custom-designed microprocessors.
- PC servers run PC-oriented network operating systems, while workstation servers run UNIX.
- e) Single UNIX workstation servers can handle much greater processing loads than can single PC servers.

**6. a) What is scalability? b) Why is scalability important in networking?**

- a) **Scalability** is the ability to grow as demand grows.
- b) If you have a solution that is not scalable, you may not be able to meet rising demand at all or may only be able to meet it by switching to a new system, which is very difficult and expensive.

**8. a) What are the three ways to increase server scalability once you have selected a basic platform (PC server, workstation server, or mainframe server)?**

**b) Which of these increases reliability?**

- a) The three basic ways to increase server capacity within a platform family are multiprocessing single computers, clusters of computers, and load balancing.

**Multiprocessing** means having the server operate multiple microprocessors to share the work load.

**Clustering** means that a small number of servers can be linked together to act as a single large server.

In **load balancing**, a load balancer such as a router assigns tasks to servers in a server farm.

- b) Clustering and load balancing increase reliability. Multiprocessing does not.

**9. a) What are the two basic types of transmission links? b) Which connects a client to a switch? c) Which connects a switch to another switch?**

- a) The two basic types of transmission links are access links and trunk links.
- b) Access links connect a station to a switch.
- c) Trunk links connect a switch to another switch.

Note: In an internet, trunk links also connect switches and routers to one another.

**10. a) What is a switching decision? b) What is packet switching? c) What is a packet? d) How does packet switching save money for data traffic? e) What is a message in a single network called?**

a) In a **switching decision**, the switch accepts a message in one port, selects another port to send the message back out, and transmits the message out that port.

b) In packet switching, messages are sent through a switched network in a series of short messages called packets.

Many short messages flow through a network more easily than fewer long messages, much as sand flows more easily through an hour glass than do pebbles.

c) Packets are short messages sent through a packet-switched network.

d) Packet switching saves money in networks by allowing trunk lines to be multiplexed. Each conversation only has to pay for its share of the trunk line's capacity.

e) A message in a single network is called a frame.

**11. a) List and briefly describe the major service quality parameters listed in the text. b) What is an SLA? c) What happens if SLA guarantees are not met?**

a) The following are the major service quality parameters listed in the text:

i- Speed, measured in bits per second, describes the throughput of a network.

ii- Latency is a measure of delay (usually in milliseconds) caused by congestion.

iii- Availability is the percentage of time the network will accept and deliver messages.

24x7x365 is the ultimate goal.

In the telephone network, the standard is 99.999% (the five nines)

iv- The **error rate** is the percentage of bits or messages that are damaged or lost during transmission.

b) An SLA (service level agreement) is a set of written guarantees for such matters as speed, latency, availability, and error rates.

c) If guaranteed goals are not met, the network provider will have to pay **performance penalties**.

**12. a) Distinguish between LANs and WANs in terms of geographical scope. b) In terms of who provides service. c) How do LANs and WANs typically differ in price and speed?**

a) Geographical scope:

A **local area network (LAN)** may consist of a few computers in a small office, all of the computers in a building, or all of the computers in a university campus or industrial park.

**Wide area networks (WANs)** transmit data *between* customer premises.

b) In LANs, the organization itself provides service; for WANs, a carrier must provide service.

This is because LANs operate on the customer premises, so the customer is responsible for everything.

c) LANs generally have a lower price-per-bit-transmitted than WANs and also are faster.

WAN speeds, by the way, are lower precisely because organizations cannot afford as much WAN traffic because of higher costs.

**13. Distinguish between WANs and MANs.**

A **metropolitan area network (MAN)** is a carrier network covering a single urban area. It is a special type of WAN.

**14. a) Distinguish between networks and internets. b) What device connects two or more networks in internets? c) Distinguish between internets and the Internet. d) What do we call the path a packet takes through an internet from the source host to the destination host?**

a) An **internet** is a group of networks linked together with routers in a way that allows an application program on any station *on any network* in the internet to be able to communicate with an application program on another station *on any other network*.

b) A router connects networks in internets.

c) An internet is any network of networks, while the Internet is the global Internet that most people use for e-mail, access to the World Wide Web, and other services.

d) The path a packet takes through an internet from the source host to the destination host is called its route.

**18. a) On the Internet, what is a host computer? b) When you connect to the Internet with a PC in your home or a laboratory, is your PC a host computer? c) What are the two types of host addresses on the Internet? d) Which is a host's official address? e) How long is an IP address? f) What happens if you know a target host's host name but not its IP address?**

a) All stations attached to the Internet are called **hosts**.

b) Yes, your home or laboratory PC is a host.

c) The two types of addresses on the Internet are IP addresses and host names.

- d) A host's official address is its IP address.
- e) An IP address is 32 bits long.
- f) If you know a target host's host name but not its IP address, your computer must call a DNS host and ask for the IP address based on the host name.

**19. a) What are the two types of carriers on the Internet? b) What is the technical function of an ISP? c) What is its economic function? d) Describe the Internet backbone.**

a) The two types of carriers on the Internet are Internet service providers (ISPs) and the backbone carriers that connect ISPs to one another.

Some companies are both ISPs and backbone carriers.

b) An ISP's technical function is to connect users to the main part of the Internet, called the Internet backbone.

c) The ISP's economic function is to fund the Internet.

**20. a) What is the community of the Internet? b) What is an intranet? c) What is an extranet? d) What is the role of a firewall?**

a) The intended community of the Internet is the entire world.

b) In an **intranet**, a firm uses Internet technology, including transmission standards and Internet applications (e-mail, the World Wide Web, etc.) for *internal* communication. The firm is its own limited community. The intranet may have links to the outside world, usually via the Internet; but these are outside the intranet.

c) In an **extranet**, the community is a group of suppliers and purchasers who agree to communicate with one another under a certain set of rules.

d) **Firewalls** separate allowed and non-allowed traffic, permitting allowed traffic to pass and discarding non-allowed traffic.

**Tough Question: Why do you think the Internet is so attractive to businesses?**

This is an open-ended question.

Answer:

- Can reach millions of customers around the world because nearly all firms and many individuals use it. (Before, there were many separate non-connected networks, and they had fewer customers.)
- Can link corporate sites across the world.
- Attractive applications (remember Supply Chain Management, Customer Relationship Management, etc)
- Good standards (e.g., TCP/IP, HTML, XML, etc)